

Patent 45198.00014.CON1

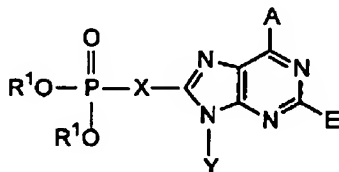
AMENDMENT

In the claims:

Please amend the claims as indicated below. A complete set of all claims previously submitted, including the status for each claim, immediately follows below.

1. – 44. Previously Cancelled

45. (Previously Added) A method of preventing type II diabetes in animals comprising administering to animals at risk of developing type II diabetes a pharmaceutically effective amount of a compound of formula 1:



wherein

A is selected from the group consisting of $-\text{NR}^8_2$, $-\text{NHSO}_2\text{R}^3$, $-\text{OR}^5$, $-\text{SR}^5$, halo, lower alkyl, $-\text{CON}(\text{R}^4)_2$, guanidino, amidino, $-\text{H}$, and perhaloalkyl;

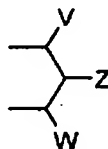
E is selected from the group consisting of $-\text{H}$, halo, lower alkylthio, lower perhaloalkyl, lower alkyl, lower alkenyl, lower alkynyl, lower alkoxy, $-\text{CN}$, and $-\text{NR}^7_2$;

X is selected from the group consisting of $-\text{alk}-\text{NR}-$, alkylene, alkenylene, alkynylene, arylene, heteroarylene, $-\text{alk}-\text{NR}-\text{alk}-$, $-\text{alk}-\text{O}-\text{alk}-$, $-\text{alk}-\text{S}-\text{alk}-$, $-\text{alk}-\text{S}-$, alicyclicene, heteroalicyclicene, 1,1-dihaloalkylene, $-\text{C}(\text{O})-\text{alk}-$, $-\text{NR}-\text{C}(\text{O})-\text{NR}'-$, $-\text{alk}-\text{NR}-\text{C}(\text{O})-$, $-\text{alk}-\text{C}(\text{O})-\text{NR}-$, $-\text{Ar}-\text{alk}-$, and $-\text{alk}-\text{Ar}-$, all optionally substituted, wherein each R and R' is independently selected from $-\text{H}$ and lower alkyl, and wherein each "alk" and "Ar" is an independently selected alkylene or arylene, respectively;

Patent 45198.00014.CON1

Y is selected from the group consisting of -H, alkyl, alkenyl, alkynyl, aryl, alicyclic, heteroalicyclic, aralkyl, aryloxyalkyl, alkoxyalkyl, $-C(O)R^3$, $-S(O)_2R^3$, $-C(O)-OR^3$, $-CONHR^3$, $-NR^2_2$, and $-OR^3$, all except H are optionally substituted;

R^1 is independently selected from the group consisting of -H, alkyl, aryl, heteroalicyclic where the cyclic moiety contains a carbonate or thiocarbonate, $-C(R^2)_2$ -aryl, -alk-aryl, $-C(R^2)_2OC(O)NR^2_2$, $-NR^2-C(O)-R^3$, $-C(R^2)_2-OC(O)R^3$, $-C(R^2)_2-O-C(O)OR^3$, $-C(R^2)_2OC(O)SR^3$, -alk-S- $C(O)R^3$, -alk-S-S-alkylhydroxy, and -alk-S-S-S-alkylhydroxy, or together R^1 and R^1 are -alk-S-S-alk- to form a cyclic group, wherein each "alk" is an independently selected alkylene, or together R^1 and R^1 are



wherein

V and W are independently selected from the group consisting of hydrogen, aryl, substituted aryl, heteroaryl, substituted heteroaryl, 1-alkenyl, 1-alkynyl, and $-R^9$; or

together V and Z are connected via a chain of 3-5 atoms, only one of which can be a heteroatom, to form part of a cyclic group substituted with hydroxy, acyloxy, alkoxycarboxy, or aryloxy-carboxy attached to a carbon atom that is three atoms from an oxygen attached to the phosphorus; or

together V and W are connected via a chain of 3 carbon atoms to form part of a cyclic group substituted with hydroxy, acyloxy, alkoxycarboxy, alkylthiocarboxy, hydroxymethyl, or aryloxy-carboxy attached to a carbon atom that is three atoms from an oxygen attached to the phosphorus;

Z is selected from the group consisting of $-CH_2OH$, $-CH_2OCOR^3$, $-CH_2OC(O)SR^3$, $-CH_2OCO_2R^3$, $-SR^3$, $-S(O)R^3$, $-CH_2N_3$, $-CH_2NR^2_2$, $-CH_2Ar$, $-CH(Ar)OH$, $-CH(CH=CR^2R^2)OH$, $-CH(C\equiv CR^2)OH$, and $-R^2$;

Patent 45198.00014.CON1

with the provisos that:

- a) V, Z, W are not all -H; and
- b) when Z is -R², then at least one of V and W is not -H or -R⁹;

R² is selected from the group consisting of R³ and -H;

R³ is selected from the group consisting of alkyl, aryl, alicyclic, heteroalicyclic, and aralkyl;

R⁴ is independently selected from the group consisting of -H, lower alkyl, lower alicyclic, lower heteroalicyclic, lower aralkyl, and lower aryl;

R⁵ is selected from the group consisting of lower alkyl, lower aryl, lower aralkyl, lower alicyclic, and lower heteroalicyclic;

R⁶ is independently selected from the group consisting of -H, and lower alkyl;

R⁷ is independently selected from the group consisting of -H, lower alkyl, lower alicyclic, lower heteroalicyclic, lower aralkyl, lower aryl, and -C(O)R¹⁰;

R⁸ is independently selected from the group consisting of -H, lower alkyl, lower aralkyl, lower aryl, lower alicyclic, -C(O)R¹⁰, or together said R⁸ groups form a bidendate alkylene;

R⁹ is selected from the group consisting of alkyl, aralkyl, alicyclic, and heteroalicyclic;

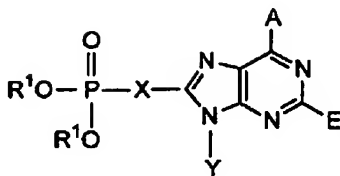
R¹⁰ is selected from the group consisting of -H, lower alkyl, -NH₂, lower aryl, and lower perhaloalkyl;

R¹¹ is selected from the group consisting of alkyl, aryl, -OH, -NH₂ and -OR³; and

pharmaceutically acceptable prodrugs and salts thereof.

46. (Currently Amended) A method of treating impaired glucose tolerance comprising administering to patients ~~in need thereof~~ a pharmaceutically effective amount of an FBPase inhibitor of formula 1:

Patent 45198.00014.CON1



wherein

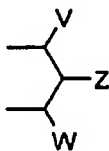
A is selected from the group consisting of $-\text{NR}^8$, $-\text{NHSO}_2 \text{R}^3$, $-\text{OR}^5$, $-\text{SR}^5$, halo, lower alkyl, $-\text{CON}(\text{R}^4)_2$, guanidino, amidino, $-\text{H}$, and perhaloalkyl;

E is selected from the group consisting of $-\text{H}$, halo, lower alkylthio, lower perhaloalkyl, lower alkyl, lower alkenyl, lower alkynyl, lower alkoxy, $-\text{CN}$, and $-\text{NR}^7_2$;

X is selected from the group consisting of $-\text{alk-NR-}$, alkylene, alkenylene, alkynylene, arylene, heteroarylene, $-\text{alk-NR-alk-}$, $-\text{alk-O-alk-}$, $-\text{alk-S-alk-}$, $-\text{alk-S-}$, alicyclicene, heteroalicyclicene, 1,1-dihaloalkylene, $-\text{C(O)-alk-}$, $-\text{NR-C(O)-NR'-}$, $-\text{alk-NR-C(O)-}$, $-\text{alk-C(O)-NR-}$, $-\text{Ar-alk-}$, and $-\text{alk-Ar-}$, all optionally substituted, wherein each R and R' is independently selected from $-\text{H}$ and lower alkyl, and wherein each "alk" and "Ar" is an independently selected alkylene or arylene, respectively;

Y is selected from the group consisting of $-\text{H}$, alkyl, alkenyl, alkynyl, aryl, alicyclic, heteroalicyclic, aralkyl, aryloxyalkyl, alkoxyalkyl, $-\text{C(O)R}^3$, $-\text{S(O)}_2 \text{R}^3$, $-\text{C(O)-OR}^3$, $-\text{CONHR}^3$, $-\text{NR}^2_2$, and $-\text{OR}^3$, all except H are optionally substituted;

R^1 is independently selected from the group consisting of $-\text{H}$, alkyl, aryl, heteroalicyclic where the cyclic moiety contains a carbonate or thiocarbonate, $-\text{C(R}^2)_2\text{-aryl}$, $-\text{alk-aryl}$, $-\text{C(R}^2)_2\text{OC(O)NR}^2_2$, $-\text{NR}^2\text{-C(O)-R}^3$, $-\text{C(R}^2)_2\text{-OC(O)R}^3$, $-\text{C(R}^2)_2\text{-O-C(O)OR}^3$, $-\text{C(R}^2)_2\text{OC(O)SR}^3$, $-\text{alk-S-C(O)R}^3$, $-\text{alk-S-S-alkylhydroxy}$, and $-\text{alk-S-S-S-alkylhydroxy}$, or together R^1 and R^1 are $-\text{alk-S-S-alk-}$ to form a cyclic group, wherein each "alk" is an independently selected alkylene, or together R^1 and R^1 are



wherein

Patent 45198.00014.CON1

V and W are independently selected from the group consisting of hydrogen, aryl, substituted aryl, heteroaryl, substituted heteroaryl, 1-alkenyl, 1-alkynyl, and $-R^9$; or

together V and Z are connected via a chain of 3-5 atoms, only one of which can be a heteroatom, to form part of a cyclic group substituted with hydroxy, acyloxy, alkoxycarboxy, or aryloxycarboxy attached to a carbon atom that is three atoms from an oxygen attached to the phosphorus; or

together V and W are connected via a chain of 3 carbon atoms to form part of a cyclic group substituted with hydroxy, acyloxy, alkoxycarboxy, alkylthiocarboxy, hydroxymethyl, or aryloxycarboxy attached to a carbon atom that is three atoms from an oxygen attached to the phosphorus;

Z is selected from the group consisting of $-\text{CH}_2\text{OH}$, $-\text{CH}_2\text{OCOR}^3$, $-\text{CH}_2\text{OC(O)SR}^3$, $-\text{CH}_2\text{OCO}_2\text{R}^3$, $-\text{SR}^3$, $-\text{S(O)R}^3$, $-\text{CH}_2\text{N}_3$, $-\text{CH}_2\text{NR}^2_2$, $-\text{CH}_2\text{Ar}$, $-\text{CH(Ar)OH}$, $-\text{CH}(\text{CH}=\text{CR}^2\text{R}^2)\text{OH}$, $-\text{CH}(\text{C}\equiv\text{CR}^2)\text{OH}$, and $-\text{R}^2$;

with the provisos that:

- a) V, Z, W are not all $-\text{H}$; and
- b) when Z is $-\text{R}^2$, then at least one of V and W is not $-\text{H}$ or $-\text{R}^9$;

R^2 is selected from the group consisting of R^3 and $-\text{H}$;

R^3 is selected from the group consisting of alkyl, aryl, alicyclic, heteroalicyclic, and aralkyl;

R^4 is independently selected from the group consisting of $-\text{H}$, lower alkyl, lower alicyclic, lower heteroalicyclic, lower aralkyl, and lower aryl;

R^5 is selected from the group consisting of lower alkyl, lower aryl, lower aralkyl, lower alicyclic, and lower heteroalicyclic;

R^6 is independently selected from the group consisting of $-\text{H}$, and lower alkyl;

Patent 45198.00014.CON1

R^7 is independently selected from the group consisting of $-H$, lower alkyl, lower alicyclic, lower heteroalicyclic, lower aralkyl, lower aryl, and $-C(O)R^{10}$;

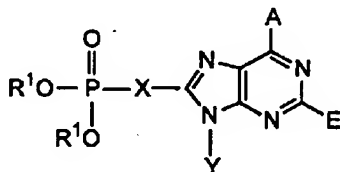
R^8 is independently selected from the group consisting of $-H$, lower alkyl, lower aralkyl, lower aryl, lower alicyclic, $-C(O)R^{10}$, or together said R^8 groups form a bidendate alkylene;

R^9 is selected from the group consisting of alkyl, aralkyl, alicyclic, and heteroalicyclic;

R^{10} is selected from the group consisting of $-H$, lower alkyl, $-NH_2$, lower aryl, and lower perhaloalkyl;

R^{11} is selected from the group consisting of alkyl, aryl, $-OH$, $-NH_2$ and $-OR^3$; and pharmaceutically acceptable prodrugs and salts thereof.

47. (Currently Amended) A method of treating insulin resistance comprising administering to patients ~~in need thereof~~ a pharmaceutically effective amount of an FBPase inhibitor of formula 1:



wherein

A is selected from the group consisting of $-NR^8$, $-NHSO_2 R^3$, $-OR^5$, $-SR^5$, halo, lower alkyl, $-CON(R^4)_2$, guanidino, amidino, $-H$, and perhaloalkyl;

E is selected from the group consisting of $-H$, halo, lower alkylthio, lower perhaloalkyl, lower alkyl, lower alkenyl, lower alkynyl, lower alkoxy, $-CN$, and $-NR^7_2$;

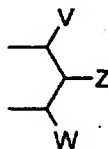
X is selected from the group consisting of $-alk-NR-$, alkylene, alkenylene, alkynylene, arylene, heteroarylene, $-alk-NR-alk-$, $-alk-O-alk-$, $-alk-S-alk-$, $-alk-S-$, alicyclicene, heteroalicyclicene, 1,1-dihaloalkylene, $-C(O)-alk-$, $-NR-C(O)-NR'$, $-alk-NR-C(O)-$, $-alk-C(O)-NR-$, $-Ar-alk-$, and $-alk-Ar-$, all optionally substituted, wherein each R and R' is

Patent 45198.00014.CON1

independently selected from -H and lower alkyl, and wherein each "alk" and "Ar" is an independently selected alkylene or arylene, respectively;

Y is selected from the group consisting of -H, alkyl, alkenyl, alkynyl, aryl, alicyclic, heteroalicyclic, aralkyl, aryloxyalkyl, alkoxyalkyl, $-C(O)R^3$, $-S(O)_2R^3$, $-C(O)-OR^3$, $-CONHR^3$, $-NR^2$, and $-OR^3$, all except H are optionally substituted;

R^1 is independently selected from the group consisting of -H, alkyl, aryl, heteroalicyclic where the cyclic moiety contains a carbonate or thiocarbonate, $-C(R^2)_2$ -aryl, -alk-aryl, $-C(R^2)_2OC(O)NR^2$, $-NR^2-C(O)-R^3$, $-C(R^2)_2-OC(O)R^3$, $-C(R^2)_2-O-C(O)OR^3$, $-C(R^2)_2OC(O)SR^3$, -alk-S-C(O) R^3 , -alk-S-S-alkylhydroxy, and -alk-S-S-S-alkylhydroxy, or together R^1 and R^1 are -alk-S-S-alk- to form a cyclic group, wherein each "alk" is an independently selected alkylene, or together R^1 and R^1 are



wherein

V and W are independently selected from the group consisting of hydrogen, aryl, substituted aryl, heteroaryl, substituted heteroaryl, 1-alkenyl, 1-alkynyl, and $-R^9$; or

together V and Z are connected via a chain of 3-5 atoms, only one of which can be a heteroatom, to form part of a cyclic group substituted with hydroxy, acyloxy, alkoxy, alkoxy, or aryloxy, or aryloxy attached to a carbon atom that is three atoms from an oxygen attached to the phosphorus; or

together V and W are connected via a chain of 3 carbon atoms to form part of a cyclic group substituted with hydroxy, acyloxy, alkoxy, alkoxy, alkylthiocarboxy, hydroxymethyl, or aryloxy attached to a carbon atom that is three atoms from an oxygen attached to the phosphorus;

Patent 45198.00014.CON1

Z is selected from the group consisting of $-\text{CH}_2\text{OH}$, $-\text{CH}_2\text{OCOR}^3$, $-\text{CH}_2\text{OC(O)SR}^3$, $-\text{CH}_2\text{OCO}_2\text{R}^3$, $-\text{SR}^3$, $-\text{S(O)R}^3$, $-\text{CH}_2\text{N}_3$, $-\text{CH}_2\text{NR}^2_2$, $-\text{CH}_2\text{Ar}$, $-\text{CH(Ar)OH}$, $-\text{CH(CH=CR}^2\text{)}\text{OH}$, $-\text{CH(C}\equiv\text{CR}^2\text{)}\text{OH}$, and $-\text{R}^2$;

with the provisos that:

- a) V, Z, W are not all $-\text{H}$; and
- b) when Z is $-\text{R}^2$, then at least one of V and W is not $-\text{H}$ or $-\text{R}^9$;

R^2 is selected from the group consisting of R^3 and $-\text{H}$;

R^3 is selected from the group consisting of alkyl, aryl, alicyclic, heteroalicyclic, and aralkyl;

R^4 is independently selected from the group consisting of $-\text{H}$, lower alkyl, lower alicyclic, lower heteroalicyclic, lower aralkyl, and lower aryl;

R^5 is selected from the group consisting of lower alkyl, lower aryl, lower aralkyl, lower alicyclic, and lower heteroalicyclic;

R^6 is independently selected from the group consisting of $-\text{H}$, and lower alkyl;

R^7 is independently selected from the group consisting of $-\text{H}$, lower alkyl, lower alicyclic, lower heteroalicyclic, lower aralkyl, lower aryl, and $-\text{C(O)R}^{10}$;

R^8 is independently selected from the group consisting of $-\text{H}$, lower alkyl, lower aralkyl, lower aryl, lower alicyclic, $-\text{C(O)R}^{10}$, or together said R^8 groups form a bidendate alkylene;

R^9 is selected from the group consisting of alkyl, aralkyl, alicyclic, and heteroalicyclic;

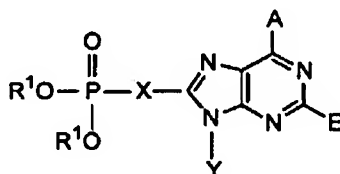
R^{10} is selected from the group consisting of $-\text{H}$, lower alkyl, $-\text{NH}_2$, lower aryl, and lower perhaloalkyl;

R^{11} is selected from the group consisting of alkyl, aryl, $-\text{OH}$, $-\text{NH}_2$ and $-\text{OR}^3$; and pharmaceutically acceptable prodrugs and salts thereof.

Patent 45198.00014.CON1

48. (Previously Added) The method of claim 1 wherein said animals at risk of developing diabetes have a disease or condition selected from the group consisting of impaired glucose tolerance, insulin resistance, hyperglycemia, obesity, accelerated gluconeogenesis, and increased hepatic glucose output.

49. (Previously Added) A method of treating or preventing a disease or condition associated with increased insulin levels selected from the group consisting of hyperlipidemia, atherosclerosis, ischemic injury, and hypercholesterolemia which comprises administering to an animal in need thereof a pharmaceutically effective amount of an FBPase inhibitor of formula 1:



wherein

A is selected from the group consisting of $-\text{NR}^8_2$, $-\text{NHSO}_2\text{R}^3$, $-\text{OR}^5$, $-\text{SR}^5$, halo, lower alkyl, $-\text{CON}(\text{R}^4)_2$, guanidino, amidino, $-\text{H}$, and perhaloalkyl;

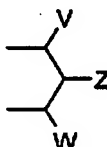
E is selected from the group consisting of $-\text{H}$, halo, lower alkylthio, lower perhaloalkyl, lower alkyl, lower alkenyl, lower alkynyl, lower alkoxy, $-\text{CN}$, and $-\text{NR}^7_2$;

X is selected from the group consisting of $-\text{alk-NR}-$, alkylene, alkenylene, alkynylene, arylene, heteroarylene, $-\text{alk-NR-alk}-$, $-\text{alk-O-alk}-$, $-\text{alk-S-alk}-$, $-\text{alk-S}-$, alicyclicene, heteroalicyclicene, 1,1-dihaloalkylene, $-\text{C}(\text{O})-\text{alk}-$, $-\text{NR}-\text{C}(\text{O})-\text{NR}'-$, $-\text{alk-NR}-\text{C}(\text{O})-$, $-\text{alk-C}(\text{O})-\text{NR}-$, $-\text{Ar-alk}-$, and $-\text{alk-Ar}-$, all optionally substituted, wherein each R and R' is independently selected from $-\text{H}$ and lower alkyl, and wherein each "alk" and "Ar" is an independently selected alkylene or arylene, respectively;

Y is selected from the group consisting of $-\text{H}$, alkyl, alkenyl, alkynyl, aryl, alicyclic, heteroalicyclic, aralkyl, aryloxyalkyl, alkoxyalkyl, $-\text{C}(\text{O})\text{R}^3$, $-\text{S}(\text{O})_2\text{R}^3$, $-\text{C}(\text{O})-\text{OR}^3$, $-\text{CONHR}^3$, $-\text{NR}^2_2$, and $-\text{OR}^3$, all except H are optionally substituted;

Patent 45198.00014.CON1

R^1 is independently selected from the group consisting of $-H$, alkyl, aryl, heteroalicyclic where the cyclic moiety contains a carbonate or thiocarbonate, $-C(R^2)_2$ -aryl, -alk-aryl, $-C(R^2)_2$ $OC(O)NR^2_2$, $-NR^2-C(O)-R^3$, $-C(R^2)_2-OC(O)R^3$, $-C(R^2)_2-O-C(O)OR^3$, $-C(R^2)_2$ $OC(O)SR^3$, -alk-S- $C(O)R^3$, -alk-S-S-alkylhydroxy, and -alk-S-S-S-alkylhydroxy, or together R^1 and R^1 are -alk-S-S-alk- to form a cyclic group, wherein each "alk" is an independently selected alkylene, or together R^1 and R^1 are



wherein

V and W are independently selected from the group consisting of hydrogen, aryl, substituted aryl, heteroaryl, substituted heteroaryl, 1-alkenyl, 1-alkynyl, and $-R^9$; or

together V and Z are connected via a chain of 3-5 atoms, only one of which can be a heteroatom, to form part of a cyclic group substituted with hydroxy, acyloxy, alkoxycarboxy, or aryloxy-carboxy attached to a carbon atom that is three atoms from an oxygen attached to the phosphorus; or

together V and W are connected via a chain of 3 carbon atoms to form part of a cyclic group substituted with hydroxy, acyloxy, alkoxycarboxy, alkylthiocarboxy, hydroxymethyl, or aryloxy-carboxy attached to a carbon atom that is three atoms from an oxygen attached to the phosphorus;

Z is selected from the group consisting of $-CH_2 OH$, $-CH_2 OCOR^3$, $-CH_2 OC(O)SR^3$, $-CH_2 OCO_2 R^3$, $-SR^3$, $-S(O)R^3$, $-CH_2 N_3$, $-CH_2 NR^2_2$, $-CH_2 Ar$, $-CH(Ar)OH$, $-CH(CH=CR^2 R^2)OH$, $-CH(C\equiv CR^2)OH$, and $-R^2$;

with the provisos that:

- a) V, Z, W are not all $-H$; and
- b) when Z is $-R^2$, then at least one of V and W is not $-H$ or $-R^9$;

Patent 45198.00014.CON1

R^2 is selected from the group consisting of R^3 and $-H$;

R^3 is selected from the group consisting of alkyl, aryl, alicyclic, heteroalicyclic, and aralkyl;

R^4 is independently selected from the group consisting of $-H$, lower alkyl, lower alicyclic, lower heteroalicyclic, lower aralkyl, and lower aryl;

R^5 is selected from the group consisting of lower alkyl, lower aryl, lower aralkyl, lower alicyclic, and lower heteroalicyclic;

R^6 is independently selected from the group consisting of $-H$, and lower alkyl;

R^7 is independently selected from the group consisting of $-H$, lower alkyl, lower alicyclic, lower heteroalicyclic, lower aralkyl, lower aryl, and $-C(O)R^{10}$;

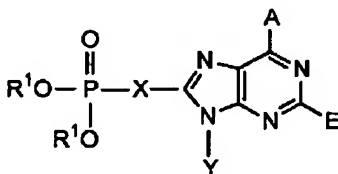
R^8 is independently selected from the group consisting of $-H$, lower alkyl, lower aralkyl, lower aryl, lower alicyclic, $-C(O)R^{10}$, or together said R^8 groups form a bidendate alkylene;

R^9 is selected from the group consisting of alkyl, aralkyl, alicyclic, and heteroalicyclic;

R^{10} is selected from the group consisting of $-H$, lower alkyl, $-NH_2$, lower aryl, and lower perhaloalkyl;

R^{11} is selected from the group consisting of alkyl, aryl, $-OH$, $-NH_2$ and $-OR^3$; and pharmaceutically acceptable prodrugs and salts thereof.

50. (Currently Amended) A pharmaceutical composition comprising a pharmaceutically effective amount of an FBPase inhibitor of formula 1:



wherein

Patent 45198.00014.CON1

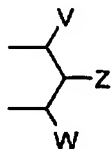
A is selected from the group consisting of $-\text{NR}^8$, $-\text{NHSO}_2 \text{R}^3$, $-\text{OR}^5$, $-\text{SR}^5$, halo, lower alkyl, $-\text{CON}(\text{R}^4)_2$, guanidino, amidino, $-\text{H}$, and perhaloalkyl;

E is selected from the group consisting of $-\text{H}$, halo, lower alkylthio, lower perhaloalkyl, lower alkyl, lower alkenyl, lower alkynyl, lower alkoxy, $-\text{CN}$, and $-\text{NR}^7$;

X is selected from the group consisting of $-\text{alk}-\text{NR}-$, alkylene, alkenylene, alkynylene, arylene, heteroarylene, $-\text{alk}-\text{NR}-\text{alk}-$, $-\text{alk}-\text{O}-\text{alk}-$, $-\text{alk}-\text{S}-\text{alk}-$, $-\text{alk}-\text{S}-$, alicyclicene, heteroalicyclicene, 1,1-dihaloalkylene, $-\text{C}(\text{O})-\text{alk}-$, $-\text{NR}-\text{C}(\text{O})-\text{NR}'-$, $-\text{alk}-\text{NR}-\text{C}(\text{O})-$, $-\text{alk}-\text{C}(\text{O})-\text{NR}-$, $-\text{Ar}-\text{alk}-$, and $-\text{alk}-\text{Ar}-$, all optionally substituted, wherein each R and R' is independently selected from $-\text{H}$ and lower alkyl, and wherein each "alk" and "Ar" is an independently selected alkylene or arylene, respectively;

Y is selected from the group consisting of $-\text{H}$, alkyl, alkenyl, alkynyl, aryl, alicyclic, heteroalicyclic, aralkyl, aryloxyalkyl, alkoxyalkyl, $-\text{C}(\text{O})\text{R}^3$, $-\text{S}(\text{O})_2 \text{R}^3$, $-\text{C}(\text{O})-\text{OR}^3$, $-\text{CONHR}^3$, $-\text{NR}^2$, and $-\text{OR}^3$, all except H are optionally substituted;

R^1 is independently selected from the group consisting of $-\text{H}$, alkyl, aryl, heteroalicyclic where the cyclic moiety contains a carbonate or thiocarbonate, $-\text{C}(\text{R}^2)_2$ -aryl, $-\text{alk}-\text{aryl}$, $-\text{C}(\text{R}^2)_2 \text{OC}(\text{O})\text{NR}^2$, $-\text{NR}^2-\text{C}(\text{O})-\text{R}^3$, $-\text{C}(\text{R}^2)_2-\text{OC}(\text{O})\text{R}^3$, $-\text{C}(\text{R}^2)_2-\text{O}-\text{C}(\text{O})\text{OR}^3$, $-\text{C}(\text{R}^2)_2 \text{OC}(\text{O})\text{SR}^3$, $-\text{alk}-\text{S}-\text{C}(\text{O})\text{R}^3$, $-\text{alk}-\text{S}-\text{S}-\text{alkylhydroxy}$, and $-\text{alk}-\text{S}-\text{S}-\text{S}-\text{alkylhydroxy}$, or together R^1 and R^1 are $-\text{alk}-\text{S}-\text{S}-\text{alk}-$ to form a cyclic group, wherein each "alk" is an independently selected alkylene, or together R^1 and R^1 are



wherein

V and W are independently selected from the group consisting of hydrogen, aryl, substituted aryl, heteroaryl, substituted heteroaryl, 1-alkenyl, 1-alkynyl, and $-\text{R}^9$; or

Patent 45198.00014.CON1

together V and Z are connected via a chain of 3-5 atoms, only one of which can be a heteroatom, to form part of a cyclic group substituted with hydroxy, acyloxy, alkoxycarboxy, or aryloxy-carboxy attached to a carbon atom that is three atoms from an oxygen attached to the phosphorus; or

together V and W are connected via a chain of 3 carbon atoms to form part of a cyclic group substituted with hydroxy, acyloxy, alkoxycarboxy, alkylthiocarboxy, hydroxymethyl, or aryloxy-carboxy attached to a carbon atom that is three atoms from an oxygen attached to the phosphorus;

Z is selected from the group consisting of $-\text{CH}_2\text{OH}$, $-\text{CH}_2\text{OCOR}^3$, $-\text{CH}_2\text{OC(O)SR}^3$, $-\text{CH}_2\text{OCO}_2\text{R}^3$, $-\text{SR}^3$, $-\text{S(O)R}^3$, $-\text{CH}_2\text{N}_3$, $-\text{CH}_2\text{NR}^2_2$, $-\text{CH}_2\text{Ar}$, $-\text{CH(Ar)OH}$, $-\text{CH}(\text{CH}=\text{CR}^2\text{R}^2)\text{OH}$, $-\text{CH}(\text{C}\equiv\text{CR}^2)\text{OH}$, and $-\text{R}^2$;

with the provisos that:

- a) V, Z, W are not all $-\text{H}$; and
- b) when Z is $-\text{R}^2$, then at least one of V and W is not $-\text{H}$ or $-\text{R}^9$;

R^2 is selected from the group consisting of R^3 and $-\text{H}$;

R^3 is selected from the group consisting of alkyl, aryl, alicyclic, heteroalicyclic, and aralkyl;

R^4 is independently selected from the group consisting of $-\text{H}$, lower alkyl, lower alicyclic, lower heteroalicyclic, lower aralkyl, and lower aryl;

R^5 is selected from the group consisting of lower alkyl, lower aryl, lower aralkyl, lower alicyclic, and lower heteroalicyclic;

R^6 is independently selected from the group consisting of $-\text{H}$, and lower alkyl;

R^7 is independently selected from the group consisting of $-\text{H}$, lower alkyl, lower alicyclic, lower heteroalicyclic, lower aralkyl, lower aryl, and $-\text{C(O)R}^{10}$;

Patent 45198.00014.CON1

R^8 is independently selected from the group consisting of $-H$, lower alkyl, lower aralkyl, lower aryl, lower alicyclic, $-C(O)R^{10}$, or together said R^8 groups form a bidendate alkylene;

R^9 is selected from the group consisting of alkyl, aralkyl, alicyclic, and heteroalicyclic;

R^{10} is selected from the group consisting of $-H$, lower alkyl, $-NH_2$, lower aryl, and lower perhaloalkyl;

R^{11} is selected from the group consisting of alkyl, aryl, $-OH$, $-NH_2$ and $-OR^3$; and

pharmaceutically acceptable prodrugs and salts thereof; and a pharmaceutically acceptable carrier.